Retour au Sommaire

Natacha MOTISI (Cirad)
Joseph MOUEN BEDIMO (IRAD)

Epidemiology of Coffee Berry Disease

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

IRAD

cirad

Arabica coffee & coffee berry disease

- Arabica coffee
  - Smallholder farmers
  - Agroforestry systems
- Coffee Berry Disease (CBD)
  - *Colletotrichum kahawae*
  - 80% yield lost

cirad

IRAD

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

Management levers

- Agro-ecological management of bioagressor
  - Tolerant varieties
  - Adapted cropping systems

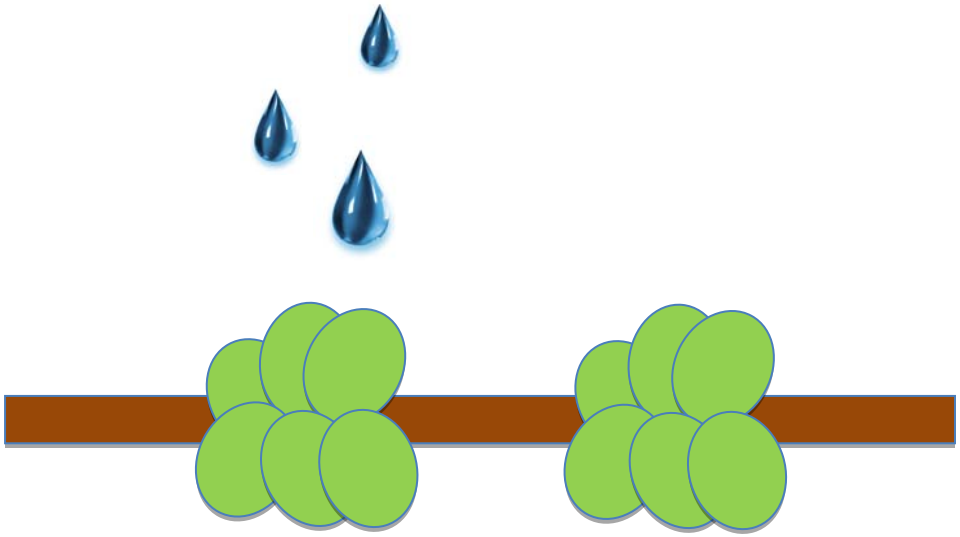
- Agroforestry systems
  - Low disease dispersal via splashing (Mouen et al., 2010)

cirad

IRAD

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

Disease dispersal via splashing



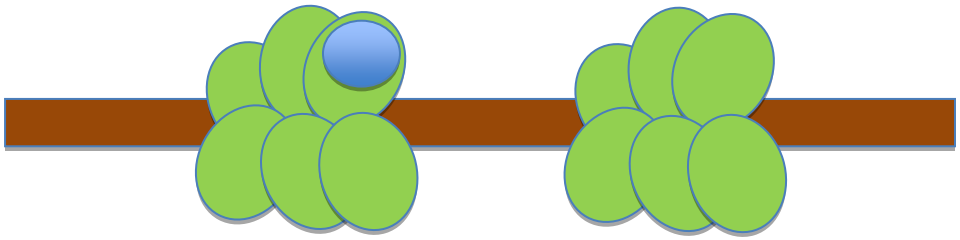
cirad

IRAD

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

Disease dispersal via splashing

Primary infections

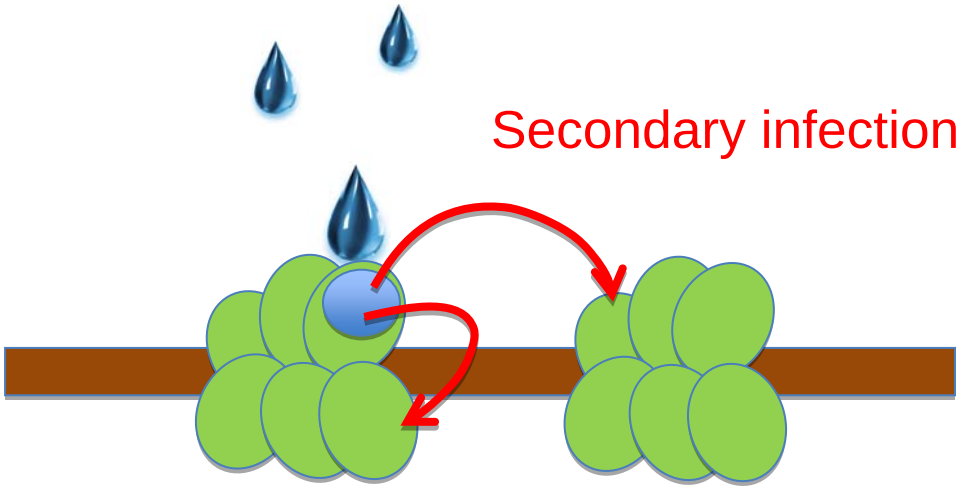


cirad

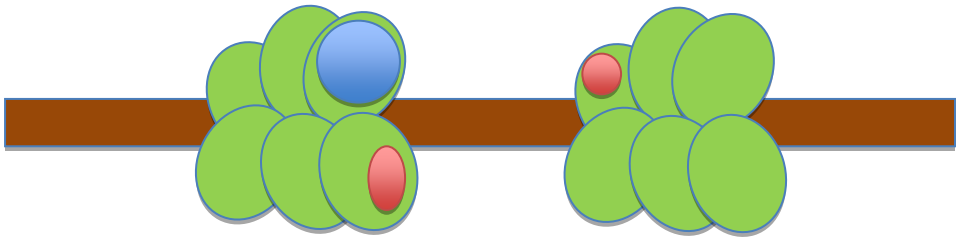
IRAD

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

Disease dispersal via splashing



Disease dispersal via splashing

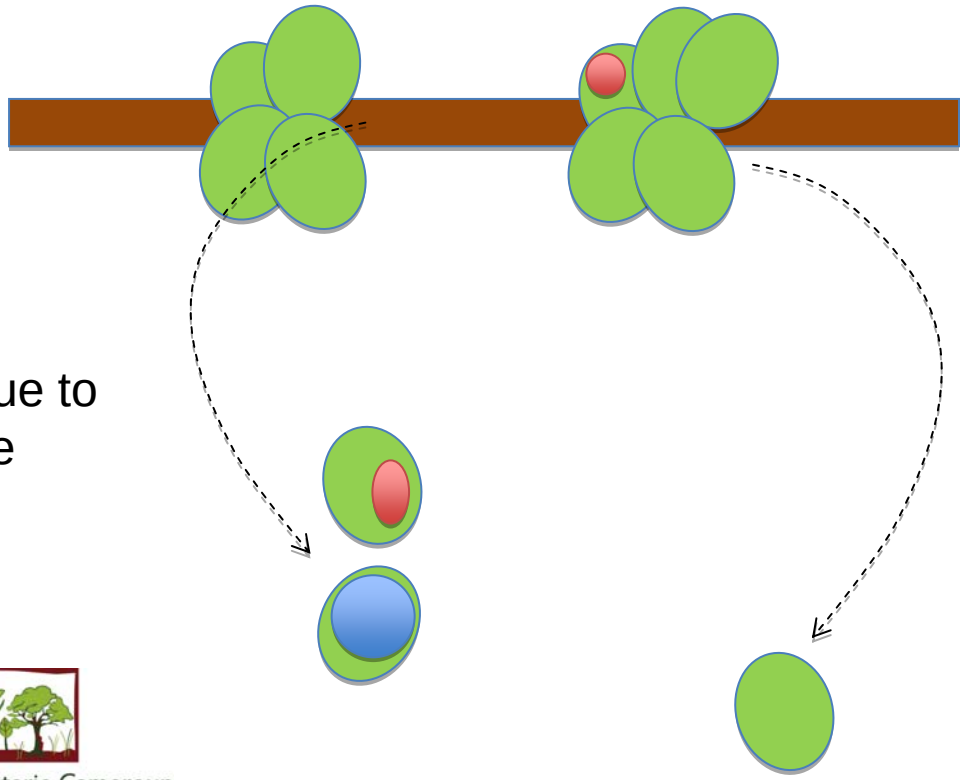


cirad

IRAD

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

Disease dispersal via splashing



Falls due to disease

Physiological falls

cirad

IRAD

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

Management levers

- Agroforestry systems
  - Low disease dispersal via splashing (Mouen et al., 2010)

- BUT antagonistic effects of shade?
  - Increase in maturation duration of berries ⇔ increase in berries susceptibility
  - Temperature / humidity favorable to disease or other BA ?

cirad

IRAD

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

Aims

1. Understanding

Dispersal mechanisms of CBD

and mechanisms by which shade limits disease dispersal

2. Analysing interactions

« genotype x environment x cropping management »

to identify the best combinations « genotypes / cropping systems »

cirad

IRAD

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

Methods

Field Experiments

cirad

IRAD

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

Field experiments
1. In farms

- Aim 1:

Link between coffee architecture and disease dispersal in the tree

- Region of high plateau in West Cameroon

	Removal of berry clusters	No removal
	Effect of distance between clusters on disease dispersal	Control

cirad

IRAD

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

Field experiments
1. In farms

- <u>But</u> removal of clusters ⇔ effect on berries susceptibility
- Control without disease

cirad

IRAD

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

Field experiments
1. In farms

- Aim 1:

Link between coffee architecture and disease dispersal in the tree

	Removal of berry clusters	No removal
No plastic Cover	Effect of distance between clusters on disease dispersal	Control (with disease)
Plastic Cover	Effect of cluster removal on berries susceptibility to CBD	Control (without disease)

cirad

IRAD

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

Field experiments
1. In farms

- Aim 2:

Disease dispersal under shading trees

Coffee trees under cola tree and under full sun

cirad

IRAD

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

Field experiments
1. In farms

- Methods

Count of berries every weeks

Temperature/humidity

Rainfall

cirad

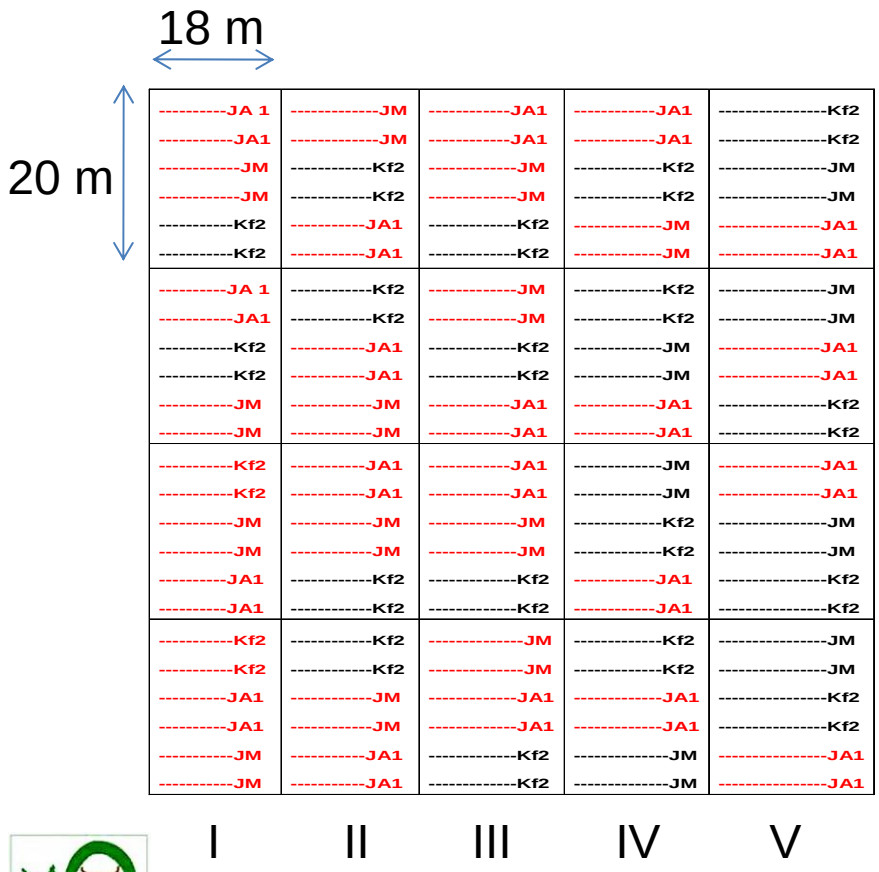
IRAD

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

Field experiments

2. Experimental station at Santa

- Aim: Interaction « genotype x shading tree »



Split-plot

Varieties:

Tolerance ↑
- Java 1 (JA1)
- Kafa 2 (Kf2)
- Jamaique (JM)

Shading trees:

Shading ↑
- Safoutier
- Avocatier
- Bananier ~ tém ss omb
- Témoin plein soleil

cirad

IRAD

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

Methods

Modelling

cirad

IRAD

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

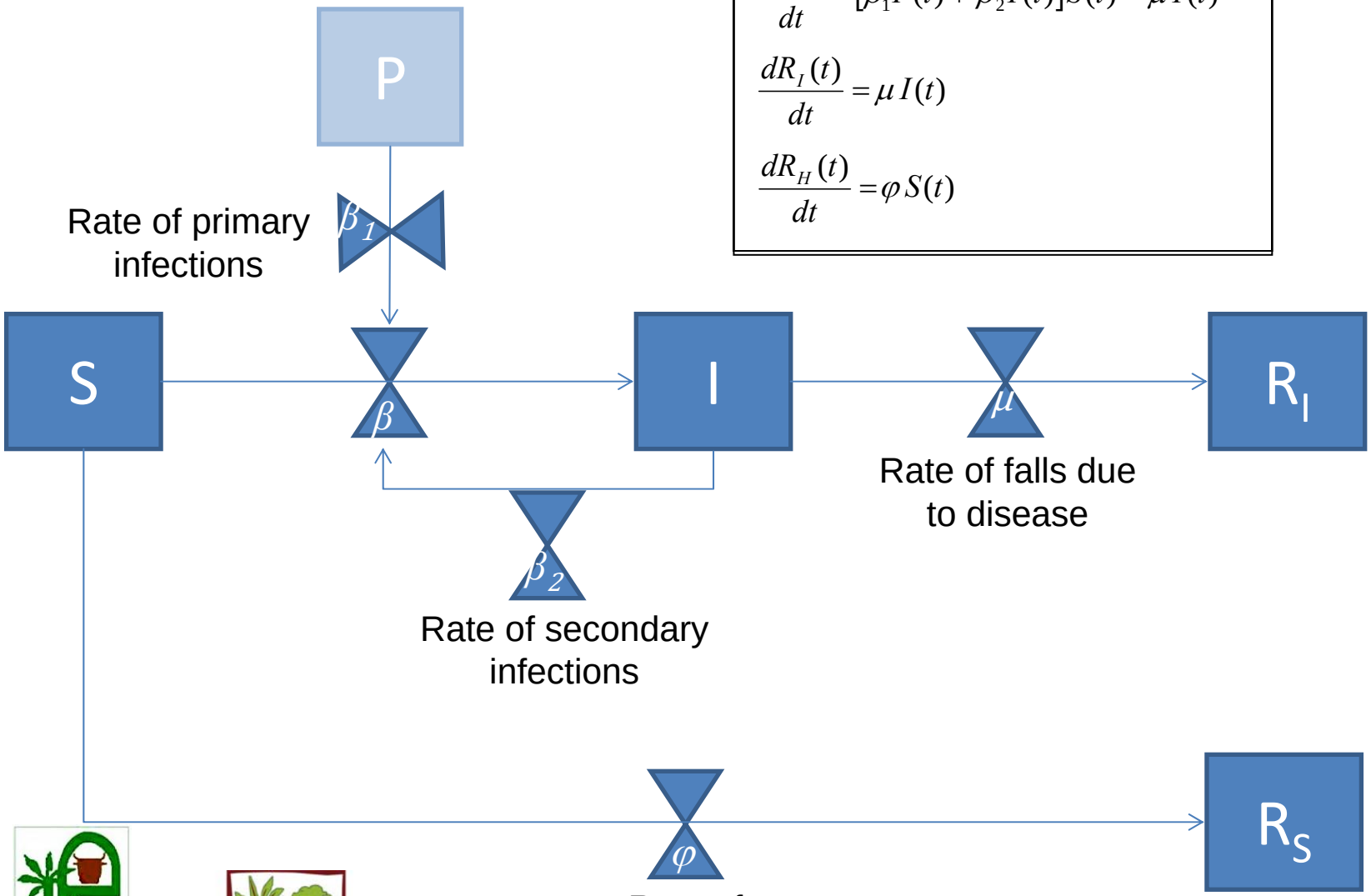
SIR model

$$\frac{dS(t)}{dt} = -[\beta_1 P(t) + \beta_2 I(t)]S(t) - \varphi S(t)$$

$$\frac{dI(t)}{dt} = [\beta_1 P(t) + \beta_2 I(t)]S(t) - \mu I(t)$$

$$\frac{dR_I(t)}{dt} = \mu I(t)$$

$$\frac{dR_H(t)}{dt} = \varphi S(t)$$

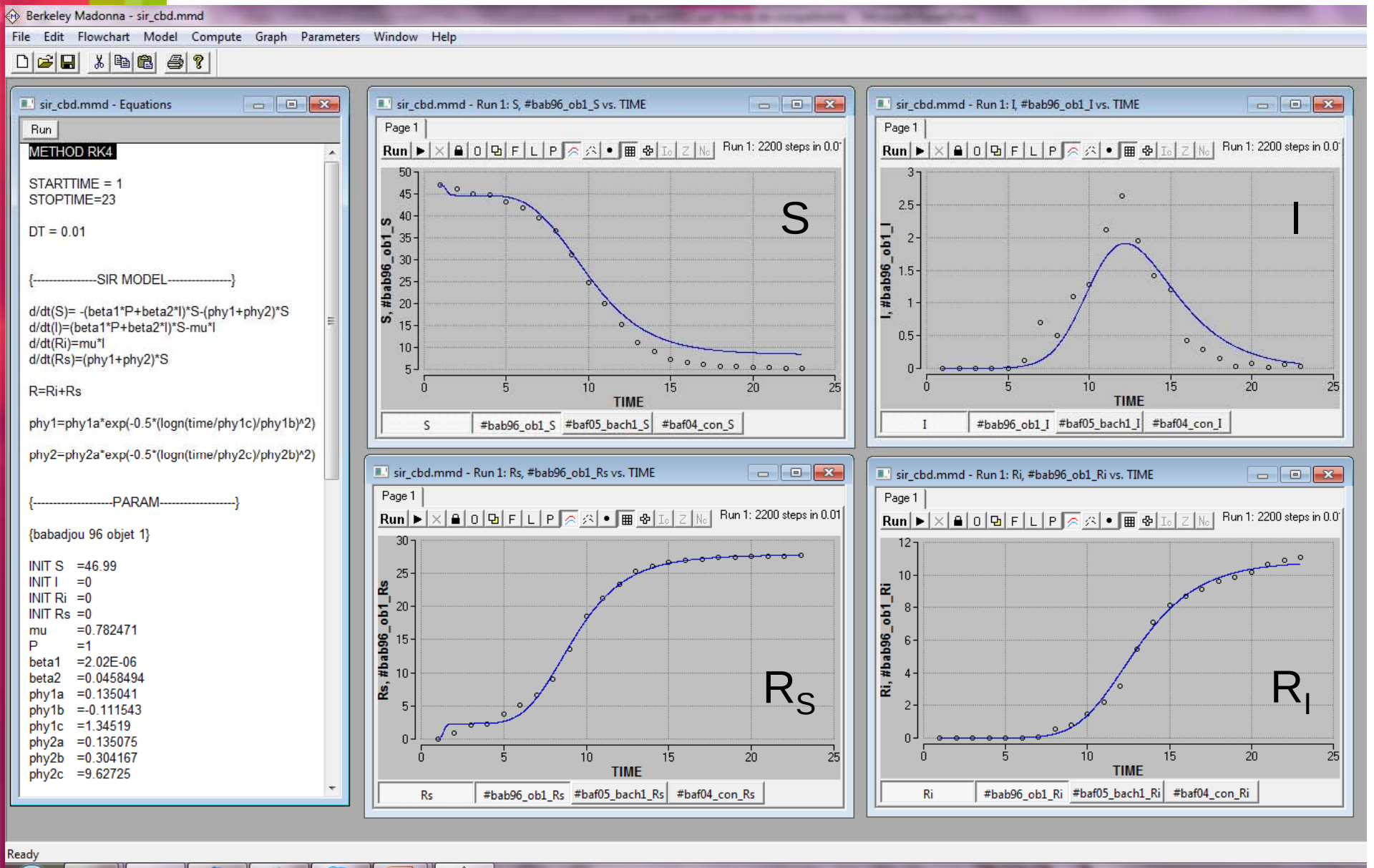


cirad

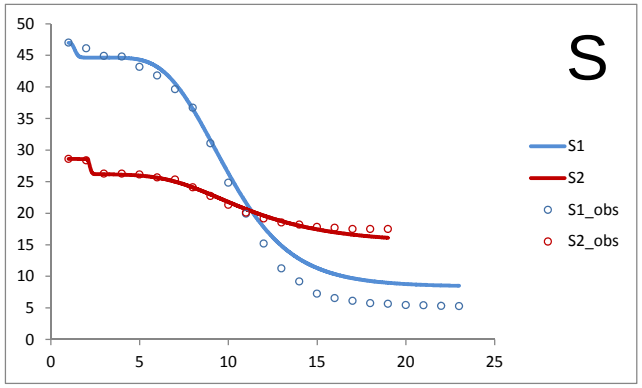
IRAD

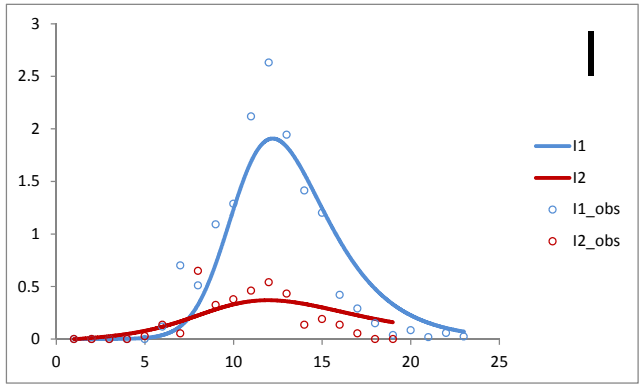
PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

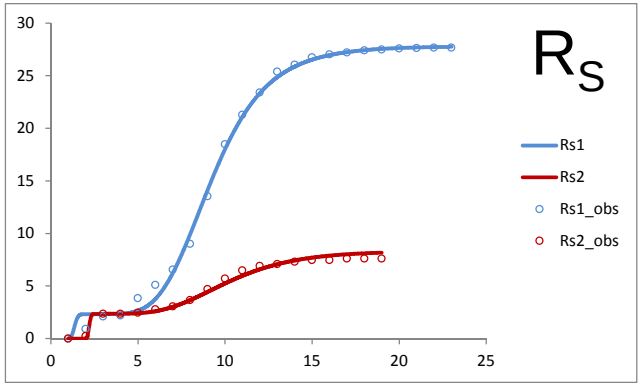
Mathematical modelling

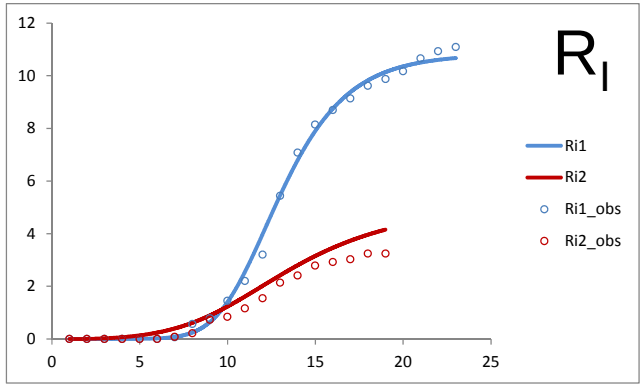


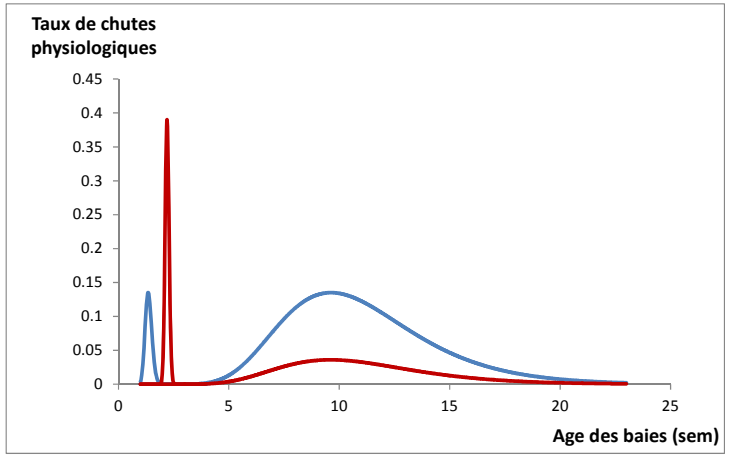
Mathematical modelling











cirad

IRAD

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

Retour au Sommaire

PCP Agroforesterie Cameroun
Pôle de compétences en partenariat

Thanks!

cirad

IRAD